

### REMARKS

With this amendment, the limitations of claims 19, 20, and 21 have been incorporated into claim 18. Claim 23 has been amended to depend from claim 18. No new matter is added. Claims 19-21 have been cancelled. Claims 1-18 and 22-23 are now pending in this application. Applicant respectfully requests the entry of the amendments and reconsideration of the application in view of the amendments and the following remarks.

#### Allowable subject matter

Applicants gratefully acknowledge the Examiner's indication of allowable subject matter for claims 1-17.

#### Rejection under 35 U.S.C. § 102(b)

Claims 18-22 are rejected under 35 U.S.C. § 102 (b) as being anticipated by Ragil, et al. (U.S. Patent No. 6,156,950).

#### *Ragil, et al. do not anticipate claims 18 and 22*

Ragil et al. divulge two versions of the process (Column 6, lines 1-12). In the first one, a first separation unit separates straight chain paraffins from branched paraffins. The denormalized feed containing branched paraffins is sent to a second unit where separation of mono-branched from multi-branched paraffins and naphthenic and/or aromatic compounds takes place. Therefore, at least two units, that is, at least two adsorbents are used to separate mono-branched paraffins from multi-branched paraffins, naphthenic and/or aromatic compounds and straight chain paraffins.

In the second version of the process, a first unit separates multi-branched paraffins and naphthenic and/or aromatic compounds from the straight chain and the mono-branched paraffins. The second unit separates two effluents, one rich in mono-branched paraffins and the other rich in straight chain paraffins. Therefore, at least two units, i.e. at least two adsorbents are used to separate mono-branched paraffins from multi-branched paraffins and straight chain paraffins. The process disclosed by Ragil et al. uses adsorbents that can only separate two effluents in one step.

In contrast, according to the present invention, mono-branched alkanes are separated from a hydrocarbon mixture consisting of linear, mono-branched and multi-branched alkanes in a one-step process, using "only one zeolitic adsorbent", i.e. one unit and "wherein mono-branched alkanes...are preferably absorbed" (claim 18 as amended). Ragil, et al. do not disclose this method. Furthermore, with the method disclosed in Ragil et al. (US 6,156,950), mono-branched alkanes cannot be separated in one step from a mixture "consisting of linear, mono-branched and multi-branched alkanes" (claim 18 as amended, emphasis added).

More in particular, the present method differs from the method of Ragil et al. in that the mixture that is brought into contact with one adsorbent is different from the mixture used in Ragil et al. More in particular, in the first version of the process as explained above, the mixture brought into contact with an adsorbent which preferentially adsorbs mono-branched paraffins is to be understood as a mixture of mono-branched and multi-branched + naphthenic + aromatic compounds, but linear compounds are not contained in such mixture as they have been separated by means of a first separation unit (see column 6, lines 1-6). In the second version of the process as explained above, the mixture brought into contact with an adsorbent which preferentially adsorbs mono-branched paraffins is to be understood as not containing multi-branched + naphthenic + aromatic compounds as these compounds have been separated by means of a first separation unit (see column lines 7-12).

Thus, the present process does not encompass the preliminary separation of linear hydrocarbons or the preliminary separation of multi-branched hydrocarbons and naphthenic and/or aromatic compounds from the mixture, as is the case in Ragil et al. In contrast, the present invention encompasses the separation of a different mixture of hydrocarbons with only one adsorbent compared to Ragil et al.

It shall be further noted that in both process versions of Ragil et al., the presence of naphthenic and/or aromatic compounds in the mixture to be separated is contemplated, while the present process does not encompass the separation of naphthenic and/or aromatic compounds as the present mixture does not comprise aromatic compounds. Note the definition of "hydrocarbon" at paragraph 0041 of the published application which is reproduced below:

The term "hydrocarbons" as used herein refers to non-aromatic alkanes or alkenes, preferably to C<sub>4</sub> to C<sub>20</sub> alkanes or alkenes, more preferably to C<sub>4</sub> to C<sub>18</sub> alkanes or

alkenes, more preferably to C<sub>4</sub> to C<sub>10</sub> alkanes or alkenes, and even more preferred to C<sub>4</sub> to C<sub>8</sub> alkanes or alkenes, and even more preferred to C<sub>4</sub> to C<sub>6</sub> alkanes or alkenes. In a preferred embodiment, the hydrocarbons are alkanes.

According to the definition, the term "hydrocarbon" refers to non aromatic alkanes or alkenes. Furthermore, the naphthenic and/or aromatic compounds are excluded by the closed "consisting of" language of amended claim 18.

Also, Applicants further note that nowhere in Ragil et al., adsorbents that preferentially adsorb mono-branched paraffins over linear and multi-branched paraffins are mentioned. Thus, in lines 20-23 in Ragil et al. "preferentially adsorbing mono-branched paraffins" means preferentially adsorbing mono-branched paraffins over multi-branched paraffins, NOT preferentially adsorbing mono-branched over linear paraffins. In the present patent application US 10/568,723 by Denayer et al, adsorbents are used that preferentially adsorb mono-branched paraffins over linear and multi-branched paraffins.

Accordingly, Applicants respectfully submit that amended claim 18 is not anticipated by Ragil, et al..

Furthermore, as claim 22 is dependent on amended claim 18, claim 22 also is not anticipated by Ragil, et al. for the reasons given above for claim 18. Further, with regard to dependent claim 22, it should be noted that Ragil et al. disclose a method based on adsorption (see Abstract), but the adsorption mechanism is not specified. The Applicants notify that to their best knowledge, all adsorption based separation processes are based on enthalpic effects rather than on entropic effects, size exclusion effects (molecules cannot enter the pores of the adsorbent) or diffusion effects. Therefore, and because there is no indication in Ragil et al. that separation is based on entropic effects, the Applicant respectfully disagrees that Ragil et al. *inherently* disclose a method based on entropic effects.

**Claims 18 and 22 are not obvious in view of Ragil, et al.**

As discussed above, the process of Ragil et al. is directed to the separation of a mixture of hydrocarbons, including aromatic and/or naphthenic compounds, using at least two separation units (operating on adsorption or by permeation) and at least one adsorption unit (see FIG. 1 and 2 – two versions of the process). The adsorption unit operates by adsorption using an adsorbent. In the method of Ragil et al, linear paraffins are adsorbed preferentially over mono- and multi-

branched paraffins, and mono-branched paraffins are adsorbed preferentially over multi-branched paraffins (see column 8, lines 29-42).

However, Ragil et al do not disclose a separation process having only one separation (and thus only one adsorption) unit for separating a mixture consisting of linear, mono-branched and multi-branched alkanes, as is the case in the presently claimed invention.

Moreover, Ragil et al do not provide any suggestion that a one-step separation/adsorption process can be used for separating such mixture, especially, since Ragil et al. do not disclose an adsorption unit that operates using an adsorbent having a suitable selectivity i.e. that preferentially adsorbs mono-branched alkanes over linear paraffins. Such type of adsorbents is not disclosed by Ragil et al. since with “preferentially adsorbing mono-branched paraffins”, Ragil et al. mean preferentially adsorbing mono-branched paraffins over multi-branched paraffins, as explained above, and not mono-branched over linear paraffins.

Furthermore, although US 6,156,950 discloses (column 1, line 23) the possibility of using an adsorbent in an adsorption unit that preferentially adsorbs mono-branched paraffins, it is not specified nor suggested by Ragil et al. that such adsorbent should be a zeolitic adsorbent as presently claimed.

Moreover, a skilled person knows that in fact, adsorption in zeolites normally prefers linear moieties in the hydrocarbon structure, and the adsorbent enumerated in column 9 do not have a selectivity for mono-branched paraffins.

In view thereof, a skilled person would not be incited to adapt the process of Ragil et al., to look for a zeolitic adsorbent having another selectivity to arrive at the one-step process of amended claim 18.

The present method as claimed in amended claim 18 should therefore be considered non-obvious. Furthermore, as claim 22 is dependent on amended claim 18, this claim should be considered non-obvious as well.

In view of Applicants’ amendments and arguments, reconsideration and withdrawal of the rejection of claims 18 and 22 as anticipated by Ragil, et al. is respectfully requested. Applicants further assert that claims 18 and 22 are non-obvious over Ragil, et al. as well.

Furthermore, claim 23 has been amended to depend from claim 18 and is non-obvious over Ragil, et al for the reasons provided above for claim 18. Additionally, although Ragil, et al.

teach a list of possible zeolitic adsorbents (see col. 9), Ragil, et al. do not teach or suggest the specific zeolite, MCM-22, as recited in claim 23.

In view of Applicants' amendments and arguments, reconsideration and withdrawal of the above ground of rejection is respectfully requested.

#### **No Disclaimers or Disavowals**

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, the Applicants are not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. The Applicants reserve the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that the Applicants have made any disclaimers or disavowals of any subject matter supported by the present application.

#### **CONCLUSION**

In view of Applicants' amendments to the claims and the foregoing Remarks, it is respectfully submitted that the present application is in condition for allowance. Should the Examiner have any remaining concerns which might prevent the prompt allowance of the application, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

Application No.: 10/568,723  
Filing Date: February 17, 2006

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

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By: Che Chereskin  
Che Swyden Chereskin, Ph.D.  
Registration No. 41,466  
Agent of Record  
Customer No. 20,995  
(949) 721-6385

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